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A
LECTURE
ON THE
ATMOSPHERE
OF
LONDON;

As read before a PUBLIC SOCIETY,
June 14th, MDCCLXXXVIII.

WITH PLATES ILLUSTRATIVE OF THE PHENOMENA,
AND A PREFACE.

By *BENJAMIN TAYLOR.* R

> "YE WHO AMID THIS FEVERISH WORLD WOULD WEAR
> A BODY FREE OF PAIN, OF CARES A MIND;
> FLY THE RANK CITY, SHUN ITS TURBID AIR;
> BREATHE NOT THE CHAOS OF ETERNAL SMOKE."
>
> ARMSTRONG.

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BRITISH MUSEUM

PREFACE.

THE Ideas which gave birth to the following Lecture on the ATMOSPHERE of LONDON, *aroſe from contemplating the Benefits ariſing to Mankind from the late Improvement in the Means of preſerving the Health of Seamen on long Voyages, and thoſe likely to ariſe, from the better Conſtruction and Management of public Priſons.*

CITIES may be conſidered as Priſons of great extent, wherein men voluntarily immure themſelves, *and for the hope of obtaining Wealth and Honours, barter pure Air, the chearful Proſpects of Nature, and almoſt every thing congenial to their well-being. But, from the Proſpect before us, there is ſome reaſon to hope, that* Public Utility *and* Public Happineſs *are begun to be conſidered on a more extenſive Scale than they have heretofore been; and that the Spirit of Benevolence and Liberality, which has lately produced ſuch happy effects in this country, will ſo tend to open the eyes of men to their true and beſt Intereſt,* DOMESTIC HAPPINESS, *that we ſhall ſee the Principles of Health as much ſought for, and adopted in private and public Buildings, as Conveniencies of leſs importance.*

But ſuch is the force of native habits, cuſtoms, &c. that an innovation on them, without the conſent of the Mind, is as much oppoſed as if it were a conſpiracy againſt our lives. When I firſt came to this City, I complained to my Landlord, who is a Citizen born, of *of the ſmell of the* Water-cloſet, *and told him I thought it very improper to be placed ſo near the* Pantry. *He replied, that ſo far from its being conſidered diſagreeable, they thought it* healthy, *and* AN ANTIDOTE AGAINST INFECTION!

The Oeconomy *of Cities, I preſume will appear not to have been much attended to, with regard to the* Health *of thoſe who from choice or neceſſity inhabit them. The Improvements which have from time to time been made in* LONDON, *are ſuch as public convenience, elegance, or ſome glaring deformity have effected.* Beauty *in the Arrangement of Buildings was thought of no importance in the time of* Sir CHRISTOPHER WREN, *who laboured to introduce it; a proof that the Principles of* Health *were then as little underſtood;—and, even* now, *there are thouſands treading a round of dull exiſtence, which the Learning, Philoſophy, and Example of a* LETTSOME *cannot reform into a better taſte of Life.* Houſes, Towns, *and*

Cities, *are grown ſo natural and familiar to us, that we feel as eaſy and content in them, as if Nature provided them for us; and very often, from this cauſe,* Prejudice *induces us to admire or acquieſce in things, which if we could behold in their proper light, we ſhould abhor.*

ART, *when properly exerciſed, helps and improves* NATURE. *This is manifeſt in a well-managed, well-cultivated* Farm *or* Garden; *and it is much to be wiſhed the happy union of theſe two Powers were as conſpicuous in this City. But here they are at variance, and* ART *has carried on the war with ſuch ſucceſsful hoſtility as almoſt to extinguiſh* NATURE.

The depriving Trees *of their natural Forms, by ſhaping them into thoſe of* Beaſts *and* Birds, *was once practiſed in this Country as* an Improvement on NATURE!

Suppoſe ſome popular Phyſician *ſhould aſſert and teach, that* RED, *of all colours, is the leaſt hurtful to the*

the Eye; *at the ſame time ſhowing his belief of it, by hanging his parlour and drawing-room with* red *hangings, or ſtaining the walls with that colour, not omitting even* red curtains *to his bed? How would this* improve NATURE?

Many apprehend the moſt dangerous conſequences from Night-Air, *and, to ſhut it out, make the room they ſleep in as tight as a ſnuff-box, to prevent its admiſſion. Now if this precaution was abſolutely neceſſary to ſecure Health, what would the* Cattle *in the* Fields *do for* Nurſes?

GOOD AIR, *and* CLEANLINESS, *are as neceſſary to the well-being of Men as* GOOD FOOD. *The unceaſing demand for this laſt article, has produced the means of regular and conſtant ſupplies; while the* Purity *of the* Air *is left to the Providence of Heaven, and the exerciſe of* Cleanlineſs *to Chance.*

If we carefully conſidered the many purpoſes to which the Air *of this City is applied, and the numerous* *offices it performs in paſſing through it, we ſhould be enabled to account for its Inſalubrity, and ſee good reaſon why* Country Air *is ſo much more beneficial to Invalids, and thoſe in a ſtate of Convaleſcence, than the* Air *of* LONDON.

If good WATER *had not been here more plentiful than* good AIR, *the means of improving it would, doubtleſs, have been proſecuted, and public encouragement eſtabliſhed to accompliſh ſucceſs; but while we are incapable of diſtinguiſhing the good* Particles *of* Air *from bad ones, by ſight; and while we inſpire an Evil which we do not perceive, but by its future effects, we are contented with it; till thoſe effects produce diſeaſe in ourſelves, or elſe awaken apprehenſions for others who are fallen a prey to it, as gloomy as the calamity we pity.*

That AIR *is capable of being* improved, *is well known.-----Had not* Nature *been furniſhed with the means of purifying it, in what ſtate would all the* Air *in the World now be, after having been in uſe ſo many thouſand ages?*

VEGETABLES; *according to the experiments of* Dr. INGENHAUTZ, *and others, are endowed with this power in a moſt eminent degree: Hence the Air of* Spring, *while* Vegetation *is in its ſplendour, obtains its vivifying virtue; and hence, in this period, the chords of life are braced up to their happieſt tones.*

NATURE, *if men would but follow her dictates, teaches in the moſt inviting manner, where ſhe provides her richeſt ſtores of congenial* Air. *Why have Poets perfumed their verſes with* wild-thyme, wild-roſes *and* marjoram, *but to call up in our minds the delightful ideas of* Health *and* RURAL LIFE? *But in the clamour of* Cities *the voice of* Nature *is unnoticed; there, Men, inſtead of inventing ſources of Health, cover every ſpare foot of ground with* human priſons *that exclude both Air and Light; while thoſe remaining*

maining uncovered, are employed as receptacles for hundreds of corrupted Dead!

The excellent Paving; *the prohibition of* projecting Signs; *the conſtruction of* common Shores *for the purpoſe of keeping the Streets dry*; *and the* rounding off the Ends of Streets—*are Improvements which have not only made this City more agreeable, but alſo more healthy.----Let us extend the Idea of* IMPROVING *ſtill further.*

PLANTS, *it has been obſerved, are found to improve the* Air *in which they grow*; *ſome poſſeſs this property in a greater degree than others, and ſuch might be ſelected and adopted into this City to advantage*: *Thoſe generally found in ſituations where Nature ſtations them, ſeemingly with a view to perform this ſalutary work, are moſt fit, becauſe they do not invite the touch, are inodorous, yet exhibit a large ſurface to the Atmoſphere, and are a good* GREEN; *as, the* large thiſtle, *red and white* archangel, nettles, *&c.*

TREES *ſhould be avoided, becauſe they deſtroy the currents of* Air; *as alſo ſuch* Plants *as ſtand the* Winter: *During that period the little ſpots of ſoil ſhould lie fallow, by which they would ſtill be performing the office they are appropriated to, and at the ſame time be preparing for the* Spring.

Conſidering how much Superſtition *has been done away in this Country, it is ſurprizing one of its worſt practices ſhould ſtill exiſt*—that of BURYING THE DEAD IN CITIES.----*No effluvia, it is well known, is ſo unwholeſome and deſtructive, as that from* human bodies *in a ſtate of* putrefaction—*and yet we piouſly ſow theſe ſeeds of diſeaſe under our windows! Were dead* Horſes, *dead* Dogs, &c. *tho' far leſs pernicious, interred in ſuch numbers ſo near our Dwellings, how different would be our ideas! But it is to be hoped, in time, we ſhall learn to reverence* Ourſelves, *as well as the* Dead; *and that a due regard to our own Health and the Welfare of our Families, will point out a more* *rational depoſit for our departed Friends, where they may lie out of the reach of doing or ſuffering injury.*

When we become wiſe enough to aboliſh this practice, we ſhall alſo be wiſe enough to convert our Church-yards *to purpoſes of* RECREATION, *better adapted to inſpire us with happy ideas of the Deity we worſhip than they are at preſent. For, would not* St. PAUL'S Church-yard, *as well as others, be more beautiful, and more uſeful, if converted into* NATURAL ELABORATORIES, *for* purifying the Air, *than in their preſent ſtate?*

SMITHFIELD *might be cultivated to the ſame advantage: Its Market at preſent, is well known to be the ſource of many* Evils. *This, and the* ſlaughtering of Cattle, *it is preſumed, might be better ordered and managed (without advancing the Price of Proviſions, or injuring the Supply of them) if conducted at ſome proper appointed ſtations, out of the City.*

Houses *might, in general, be made more ſweet and comfortable, and leſs liable to unpleaſant Fumes, if the* Water-cloſets *were vented with Pipes that reached to the Houſe-top. But the improvement would be more complete, if* Ceſs-pools *were entirely aboliſhed. Caſks, of ſuch a ſize, which when full one man could eaſily remove, might be made uſe of, and taken away regularly, by the* Duſt-man, *to be emptied, who might at the ſame time put clean ones in their place. This method would not be much more expenſive than the preſent, becauſe all the parts of a thing taken together are equal to the whole; and if it is attended with a little more trouble, the compenſation is adequate.*

An Encouragement to frequent Bathing, *would induce a more general practice of* Cleanlineſs *among Individuals; and, conſequently, a greater degree of* Health. *For this purpoſe* Baths *might be eſtabliſhed on the* River, *to which all might reſort without expence,*

pence, and enjoy ſo refreſhing and agreeable an exerciſe in the utmoſt ſafety.

To conclude. A Year has elapſed ſince the following Lecture was publickly read; in which time the Author has found no reaſon to alter the opinions he then had on the Air *of* LONDON; *on the contrary, thoſe opinions are ſtrengthened and confirmed, both by obſervation and facts. In his own mind he is perſuaded, the Improvements he has herein taken the liberty to ſuggeſt, however* new, *are well-founded— and, if put in practice, would conſpire to make Cities a more natural reſidence for Men; more favourable to the Health of Infancy; and alſo tend to* LESSEN *the number of* MORAL EVILS.

LONDON:
June, 1789.

B. T.

A

LECTURE, &c.

GENTLEMEN,

THE liberal diſpoſition I have had the happineſs to find in this Society for communicating uſeful Information, induces me to crave your attention on a ſubject hitherto uninveſtigated.

THE ATMOSPHERE over this great City, on the *purity* of which ſo much of our well-being depends, has not, to my knowledge, ever had the laws by which it is governed, or its phenomena, explained.

The general Atmoſphere to this great globe we inhabit, is the receptacle of every vapour and exhalation that aſcends from all bodies upon it, whether ſound or putrid: And we generally find that beauty and ſprightlineſs in Nature, depend principally on the purity and wholeſomeneſs of the atmoſpheric Air. For wherever, and by whatever means THAT becomes corrupted, Nature becomes diveſted of her ſweeteſt charms.

That the Air of this City is *impure*, is manifeſt to every perſon who compares the athletic ſtrength and hardy activity of a country Ploughman, to the meagre countenance and invalid frame of a Citizen; the growth of whoſe tender offspring is retarded by the uncongenial influence of the *vapours* that ſurround them, under which they frequently periſh, like the early buds of Spring by ſome untimely froſt, and drop into their grave, before they can liſp the names of their diſtreſſed parents!

But this difference between Country and City Health, is not more conſpicuous in our Species, than in thoſe of Plants and Animals. The load that Nature here pines and languiſhes under, defaces *all* her enlivening looks. Trees, Shrubs, and Flowers, are as much diveſted of their beauty and chearfulneſs as our domeſticated animals;---- the dull, inactive, unſightly appearance of our Dogs and Cats, is a proof of what I ſay.

The clouds of Smoke, Vapour, and corrupted Effluvia with which we are daily ſurrounded, and with which *our* Atmoſphere is ſo overcharged, would very ſoon render this City a ſcene of diſeaſe and death, were not their malignant influence corrected nightly, by a miraculous operation, carried on between *Sun-ſet* and *Sun-riſe*, whereby the

Air is reſtored to a degree of purity, and made fit for the next day's reſpiration.

Any attempt at the Solution of this great and important Problem, will, I dare ſay, not be diſcouraged by the Members of this Society; but facilitated and aſſiſted, by freely beſtowing their kind ſentiments and judicious obſervations, to accompliſh the deſign of their humble brother.

All ſingle Houſes, Villages, Towns and Cities, are the work of ART.-------To explain the Phenomena of the Atmoſphere over this vaſt aggregate of buildings, it will be preparatory, firſt, to pay ſome attention to that over a ſingle Cottage.

Now here, when the Weather has been ſome time dry; when the ſky is clear and unclouded, and no particular wind prevails, but a mild, gentle, zephyr-like breeze, the Barometer and Thermometer alike indicating *dry* weather, the Smoke from the chimney of a cottage, if the fire is lighted about ſun-riſe, aſcends in a perpendicular column, approaching ſomewhat to the form of an inverted cone. The altitude and form of this column depends, on the ſtrength of the fire, on the height and width of the chimney, and on the power in the Atmoſphere to *diſſolve* the ſmoke ariſing from the burning fuel. (*See Plate*, No. I.)

While the Sun is aſcending from the horizon to the meridian, the power in the Atmoſphere to *diſſolve* ſmoke, ſteam, or vapour, *increaſes*; conſequently the aforeſaid column decreaſes in magnitude, ſo that about noon it is ſcarcely viſible. —— (*See Plate*, No. II.)

The meridian heat being continued till a few hours before ſun-ſet, the phenomenon undergoes little variation. But as the ſun approaches nearer the horizon, the diſſolving power in the Atmoſphere becomes weaker; of courſe the column appears larger; but decreaſing in its altitude, as the night cold advances, till it proſtrates itſelf below the chimney. (*See Plate*, No. III.)

Such are the appearances in the Atmoſphere over a ſingle chimney, under the circumſtances juſt deſcribed.-----We will now conſider the nature of Fuel.

The warmth of a Fire in cold weather is remembered, by an ENGLISHMAN, with ſuch an attractive ſenſation, that when he goes into a room, altho' there be no fire in the grate, he places himſelf mechanically at the chimney corner.

It is well known, that the ſmall quantity of *aſhes* bear but a trifling proportion to the quantity of *coals* conſumed in a kitchen fire. It is as well known, by *Bakers* eſpecially, that the quantity of *aſhes* bear ſtill leſs proportion to the quantity of WOOD conſumed in making hot their ovens.--------How are theſe great deficiencies to be accounted for?

By a chemical analyſis of *Pitcoal,* we find it conſtituted of Water, Air, Sulphur, and a heavy Oil, like Tar, combined with but a ſmall portion of Earth; the Air *alone* forms more than $\frac{1}{3}$part of its weight; the Water, Oil, and Sulphur together in a ſtill greater proportion.----This Air, Oil, Water, and the unburnt particles, which are all carried off during combuſtion, amount to more than $\frac{7}{8}$ of the weight of the Coal, before burning; and hence the deficiency.

In the analyſis of *Wood,* we find ſtill leſs ſolid, or terreſtrial matter: Air, and Water, conſtituting 97 parts, out of 100, of its weight.

From this brief ſtatement of the conſtituent parts of Pit-coal and Wood, we may deduce one of the cauſes of the *unhealthfulneſs* of Cities, where vaſt quantities of Coal are annually burnt; and particularly, how ill adapted their Air is, for the ſupport of either animal or vegetable Life, while phlogiſticated ſo much by Fuel alone: Not to mention the noxious effluvia of *corrupted bodies* —the *ſteams* ariſing from ſuch crowds of men, and from animals—the fermentation of the *ſtagnate water*, in almoſt every ſtreet—beſides various *pernicious* Manufactures, with which they abound.

Air being a principal agent in the Phenomena now enquired into, it will be proper, before we proceed further, to conſider ſome of its properties. —Air, then, is a fluid, tranſparent body; and is, when pure, one of the principal ſupports of the vital flame. It ſurrounds this Earth to a very great height, and is to Birds that fly, what the Sea is to Fiſhes that ſwim. Congregated bodies of vapour, or *clouds*, are ſuſpended in it, at heights proportionate to *its* denſity, or *their* lightneſs. One of its peculiar properties is its *Elaſticity*:-----Three hogſheads, or 189 gallons of Air have been compreſſed into the ſphere of an Air-gun, not more than three inches in diameter.

HEAT expands *all* bodies; but on Air it has a more ſenſible effect than any other agent. This may eaſily be proved, by putting a ſmall quantity of cold Air into a Bladder, tying it up cloſe, and then holding it to the Fire, it will expand ſo as to *fill* the bladder; and if the heat be continued, it will *burſt* it with a loud report. But if, when the Heat has ſo far operated on the Air, and expanded it to the ſize of the Bladder, you then take the Bladder *from* the fire and expoſe it to the *cold*, the incloſed Air will ſhortly be condenſed into the ſame ſmall ſpace in which it was before contained.

AIR in an expanded or rarified ſtate, is lighter than an equal bulk of Air in a condenſed ſtate;--- conſequently, as all *heavy* fluids deſcend, by their ſuperior gravity, through *light* ones, rarified Air will aſcend in a body of condenſed or heavy Air, in the ſame manner that Oil aſcends in Water, and *vice verſa.*

WARM AIR is capable of diſſolving a much greater quantity of Vapour than COLD; the aſcent of Vapour is therefore more abundant in Summer than in Winter; this is manifeſt from the rapidity with which Streets and public Roads dry after being watered. This capacity in warm Air to diſſolve a greater quantity of moiſture than cold, without injuring its tranſparency, is the reaſon why the atmoſphere over this City is cleareſt in hot weather.

Beſides the vaſt quantity of *moiſture* in the Atmoſphere of this City, there is a conſiderable quantity of *dark-coloured particles*, which characteriſes all Vapours ariſing from chimneys----*Smoke*-----But I will give you a more proper definition. There is a quantity of Air rarified, or made lighter by coming into contact with the heat and fire of a room, up the chimney of which it aſcends, by means of that relative levity it obtained by ſuch contact and rarefaction. This current of rarified Air becomes viſible, or has its tranſparency deſtroyed, by carrying along with it the Steam or Vapour ariſing from the burning Fuel, and ſuch ſmall particles of that Fuel, as the Fire has ſeparated but not inflamed;-----This is SMOKE.

The upward current of rarified Air from Chimnies would not be viſible, but for the particles of Steam and Soot brought along with it. Being ſo *muddied*, (if I may be allowed that expreſſion) we are enabled to trace it from the mouth of the chimney into the Atmoſphere, in the ſame manner we may trace the muddy ſtream from Fleet-Ditch into the Thames.

Having pointed out the phenomena over a Cottage chimney for a day----Having briefly ſtated the analyſis of common Fuel, and pointed out ſome of the properties of Air; I now beg your attention, while I apply the preceding obſervations, as helps to explain the phenomena of the Atmoſphere, under which we and our fellow-citizens live.

Have any of you ever riſen before the Sun this month paſt, to treat your *lungs* with Air congenial to your Natures, and your *eyes* with an extenſive view of this City? If you have not, you are ſtrangers to the vaſt Idea ſuch an unobſtructed View would then give you----a View of one of the moſt prodigious works of Art this World can produce; no Vapour, no Smoke is then to be ſeen: Chimney behind chimney, as far as the *eye* can reach, is ſo well defined, and ſeen with ſo much diſtinctneſs, that you might diſcover a pigeon ſitting.

The inhabitants of the City, ſo called, give the firſt proof of their being awake, by the ſmokes they ſend up; the cloud ſpreads as their ſuburbian neighbours light their fires; when, about Seven o'clock, the late extenſive proſpect of churches, and chimneys without end, is obſcured in a cloud of Smoke and Vapour.

The cauſes of this Phenomenon are—The currents of Air from the chimneys, rarified by lighting the fires, carry up more vapour or ſteam, from the fuel, than the ſurrounding Air, in the cool ſtate it is then in, can *diſſolve*; conſequently it muſt deſtroy the tranſparency of the Atmoſphere, and form a Cloud.

In proportion as the Sun advances towards the Meridian this Cloud decreaſes, ſo much, that from about Eleven o'clock in the forenoon, till towards the evening, there is ſcarcely any to be ſeen: But to thoſe who view the City at the diſtance of ſeven or eight miles, a *dulneſs*, of a dun colour, tinges the Atmoſphere over it; and if they be out of ſight of the City, and ſtrangers to its ſituation, they will point it out pretty accurately by this dull or rather *dun* appearance.

The cauſes of theſe Phenomena are—The morning cloud of Vapour is *diſſolved*, ſo ſoon as the Sun has communicated a ſufficient degree of warmth to the Atmoſphere; therefore, while this ſtate of warmth continues, all the aſcending Vapour will be inſtantly *diſſolved*, and conſequently no cloud can be formed.

The dun, or ſmoky tinge, remaining viſible, is the minute particles of uninflamed fuel, called Soot, which are *diffuſed* in the Atmoſphere, not *diſſolved*, becauſe *they* are not *fluid*.

THESE are the general Summer Phenomena in the Atmoſphere over this City. A *Shower* or *Squall* ſometimes comes on:—an explanation of which, with its Phenomena, may not only ſerve to prepare you for the explanation of Autumnal and Winter

Fogs, but at the ſame time be new and entertaining.

Theſe Showers are not brought from any great diſtance by the Winds; in general they are the local Vapours diſſolved in the Atmoſphere precipitated in drops, by a ſudden condenſation.

A real view of this operation is highly entertaining. It comes on with a gradual dulneſs; hardly a leaf is ſeen to vibrate. The warmth of the Atmoſphere *decreaſing*, the riſing Vapours ceaſe to be *diſſolved*; the Air loſes its tranſparency, and becomes miſty; the Cloud accumulates over the City; the ſmokes from ſingle chimneys begin to form thick irregular columns; the miſtineſs grows heavier; till, at laſt, the particles of diſſolved Vapour are brought ſo near each other, as to be mutually attracted; a number of them united become too heavy to float; the combined particle deſcends—in its deſcent its magnitude increaſes by the acceſſion of other particles, until it arrives at the ſurface of the Earth—a palpable *Drop of* Rain. (*See Plate*, No. IV.) The Atmoſphere now deſcends; the condenſation goes on briſkly; the Drops follow one another with increaſing rapidity---- and in this manner Vapour, or Steam diſſolved in the Air is precipitated in *Showers.*

In Winter, the ſtate of the Atmoſphere over this City, is very different to what it is in Summer. The difference ariſes from the coldneſs of the Air; the greater number of Fires; of courſe an increaſed conſumption of Fuel, conſequently an increaſe in the quantity of Vapour. But as an enumeration of every appearance in our Atmoſphere during that gloomy period, would now be unſeaſonable, and take up much time, I will cloſe this Lecture with a brief account of a *Winter's Fog*, which ſometimes is ſo heavy and dark, as to prevent our ſeeing objects diſtinctly at only forty yards diſtance.

At this period of the year, our Atmoſphere is in a condenſed ſtate, conſequently it has not the power to diſſolve Vapour, as in Summer; for which reaſon, the cloud over the City prevails during the greateſt part of Autumn and Winter; in this ſpace the Wind is generally in the points oppoſite to thoſe it occupied in Summer, and blows chiefly from between the N.N.W. and S.E.

The heavy ſuffocating Fogs we ſometimes experience, are generally produced by a Wind from the N.E. or N.N.E. This Wind ſweeping over the cold Snows of Ruſſia and Norway, falls, by its own gravity into the German Ocean, which being many degrees warmer, it is rarified by paſſing over its agitated ſurface; from which it riſes, ſaturated with humidity, and continues its courſe, diſcharging its moiſture on every thing that obſtructs its progreſs. When it comes into contact with the Atmoſphere over this City, (which, beſides its natural quantity, contains all the Vapour from the Fuel under combuſtion) the trifling artificial expanſion, which but juſt ſupported the immenſe Cloud over us, is deſtroyed by the acceſſion of cold Vapour it brings along with it; in this ſuperſaturated ſtate, it deſcends upon us, fills the ſtreets and houſes, and bringing down with it all the ſooty particles which conſtituted its blackneſs, we are completely inveloped in a cloud of Smoke, which if continued, would not only render every thing about us diſagreeable, and make our lives very uncomfortable, but its cauſtic quality would ſeize upon our lungs, reſtrain their vigour, and at laſt, render them totally incapable of their office.

FINIS.

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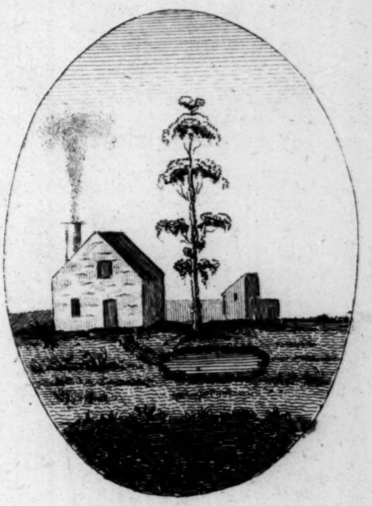

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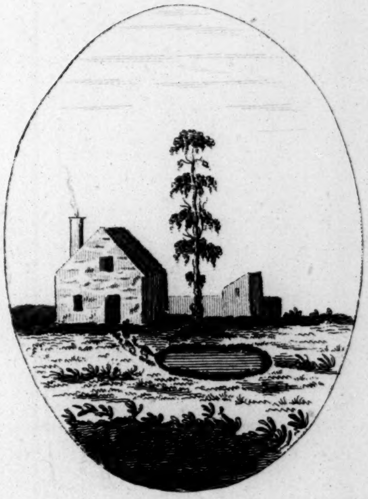

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